HAND VACUUM CLEANER

BACKGROUND OF THE INVENTION

(a) Field of the Invention

The present invention is related to a hand vacuum cleaner, and more particularly to one provided with adjustable nozzle width and retractable hose hidden in dust receiver and automatically ejects in use.

(b) Description of the Prior Art:

Hand vacuum cleaners generally available in the market have a fixed nozzle that prevents from adjustment for its width; therefore, specific external accessories including flexible hose, wider nozzle or nozzle in other dimensions are required to extend the hose and/or change the wide of the nozzle. When not used, those external accessories must be separately stored and fetched out for assembly when the hand vacuum cleaner is needed. While time is wasted on the assembly, those external accessories are vulnerable to loss or damage. Therefore, the separate design of the external accessories is not very handy for the use of the hand vacuum cleaner.

SUMMARY OF THE INVENTION

The primary purpose of the present invention is to provide a hand vacuum cleaner integrated with adjustable nozzle width and retractable hose.

Another purpose of the present invention is to provide a hand

vacuum cleaner integrated with adjustable nozzle width. To achieve the purpose, on one side or on both sides of the principle nozzle is or provided with one expanded nozzle or two expanded nozzles. Each expanded nozzle is comprised of a slider and one or more than one connectors. When the slider retreats to engage to the connector, the vacuum cleaner operates with its original nozzle width; when required, both of the slider and the connector expand outward to allow wider nozzle for larger vacuum area for time saving, easier operation and significant increase of improved efficiency to make sure the built-in accessories will not get lost and to eliminate the need for separate storage of external accessories.

Another purpose yet of the present invention is to provide a hand vacuum cleaner with adjustable nozzle width. To achieve the purpose, the slider may be adapted to one or more than one connector by means of matching hookers to ensure that the slider and the connector won't separate from each other when the slider is expanded.

Another purpose yet of the present invention is t provide a hand vacuum cleaner with retractable hose. To achieve the purpose, an inner sleeve is provided in the dust receiver of the vacuum cleaner, and the primary nozzle is adapted with a built-in hose. The hose is flexible so to be compressed to be stored in the inner sleeve. The flexible hose will be ejected out of the sleeve for a doubled length if required to facilitate cleaning where prevents direct access, such as the drawer, slit or groove.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is an exploded view of a preferred embodiment of the present invention.

Fig. 2 is a sectional view of an assembly of the preferred embodiment of the present invention.

Fig. 3 is a sectional view showing a nozzle in its narrow status of the preferred embodiment of the present invention.

Fig. 4 is a sectional view of a dust receiver of the preferred embodiment of the present invention.

Fig. 5 is a perspective view of an expanded nozzle of the preferred embodiment of the present invention.

Fig. 6 is a sectional view of an assembly of the expanded nozzle of the preferred embodiment of the present invention.

Fig. 7 is a perspective view of the appearance of the expanded nozzle of the preferred embodiment of the present invention.

Fig. 8 is a perspective view of the appearance of the narrow nozzle of the preferred embodiment of the present invention.

Fig. 9 is a sectional view of a release key of the preferred embodiment of the present invention.

Fig. 10 is a bottom view of the release key of the preferred embodiment of the present invention.

Fig. 11 is a bird's view of a local part of the preferred embodiment of the present invention.

Fig. 12 is a sectional view showing that the release key of the preferred embodiment of the present invention is mounted to a holder.

Fig. 13 is a cross view of a local part showing the combination by means of matching hookers between a slider and a connector of the preferred embodiment of the present invention.

Fig. 14 is a schematic view showing that the release key and the slider of the preferred embodiment of the present invention are hooked to each other.

Fig. 15 is a sectional view showing that the release key and the slider of the preferred embodiment of the present invention are hooked to each other in position.

Fig. 16 is a sectional view showing that the slider compressed by the release key of the preferred embodiment of the present invention is released.

Fig. 17 is a sectional view showing those primary members of the dust receiver of the preferred embodiment of the present invention.

Fig. 18 is a schematic view showing that the primary nozzle of the preferred embodiment of the present invention is released but not yet closed up.

Fig. 19 is a schematic view showing that the primary nozzle of the preferred embodiment of the present invention is released and closed up.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to Figs. 1, 2 and 3, a preferred embodiment of the present invention of a hand vacuum cleaner is essentially comprised of a cleaner 1, a primary nozzle 2 and one set or two sets of expanded nozzle 3, 3a. Wherein, the cleaner 1 related to

a prior art includes a dust receiver 11, a strainer 12, a fan 13, a motor 14, a power switch 15, a handle 16, and a battery set 17. In a preferred embodiment of the present invention, an opening 18 is formed at the front end of the dust receiver 11 of the cleaner 1 to accommodate combination of the primary nozzle 2 and both expanded nozzles 3, 3a. Multiple retainers 181 (181a) and 182 (182a) are each respectively provided on both sides of the inner wall and the bottom of the opening 19. A holder 111 is provided to the dust receiver 11 at the top of the opening 18. As illustrated in Fig. 4, a through hole 112 is each provided on both sides of the holder 111, a retainer 113 is each provided on both side walls of the tray, and a through hole 114 is provided at the lower end of the holder 111.

The primary nozzle 2 related to a member with narrow nozzle having at its terminal connected to a flexible hose 21 and a positioning grain 22 is provided on the wall at the top of the nozzle.

Both sets of the expanded nozzle 3, 3a are provided on both sides, or one set of the expanded nozzle 3 is provided on a selected side of the primary nozzle 2. Each set of expanded nozzle 3 is comprised of a slider 31 (31a) and a connector 32 (32a) engaged to each other by sliding. A coil 33 (33a) is provided to each set of the expanded nozzle 3 placed at where between the slider 31 (31a) and the connector 32 (32a) moveably inserted in the nozzle 18 of the dust receiver 11. Both of the slider 31 (31a) and the connector 32 (32a) are either expanded away from each other as illustrated in Figs. 5, 6 and 7 when the coil 33 (33a) is released,

or retreated into each other as illustrated in Fig. 3 or Fig. 8 when the coil 33 (33a) is compressed.

The holder 111 provided on the upper wall at the front end of the dust receiver 11 contains a release key 19 as illustrated in Figs. 9, 10 and 11. A hook 191 is each provided on both outer walls of the release key 19. A first plunger 192 is each provided at a selected location to push and release the expanded nozzle 3 (3a), and a second plunger 193 to push and release the primary nozzle 3. A return coil 194 as illustrated in Fig. 12 is pre-planted into the release key 19 for a fast return of the release key 19 when compressed. Furthermore, as reinforcement to the structural strength of the first plunger 192, an additional rib 195 is connected to the first plunger 192 at where between the first plunger 192 and the inner wall of the release key 19.

The expanded nozzle 3 (3a) is comprised of the slider 31 (31a) and a connector 32 (32a) by means of two matching hooks for both of the slider 31 (31a) and the connector 32 (32a) to retreat into each other, thus to make sure that they will not disengage from each other. As illustrated in Figs. 13 and 14, two matching hook bits 311 (311a) and 321 (321b) respectively extending from the slider 31 (31a) and the connector 32 (32a) constitute relative retainers for both of the slider 31 (31a) and the connector 32 (32a) while another end of the hook bit 321 (321a) provided to the connector 32 (32a) is held by the retainer 181 (181a) from the inner wall of the opening 18 as illustrated in Fig. 6. Accordingly, when the expanded nozzle 3 (3a) is stretched out, it functions a limiting retainer as illustrated in Figs. 6 and 7 to prevent both of

the slider 31 (31a) and the connector 32 (32a) to disengage from each other. On the other hand, when the opening returns to narrow nozzle, the hook bit 311 (311a) is used to block a sidewall 23 of the primary nozzle 2.

As illustrated in Figs. 1 and 5, the slider 31 (31a) and the connector 32 (32a) are each respectively provided with the hook bit 312 (312a) and a matching groove 322 (322a) for the hook bit 312 (312a) to slide in the groove 322 (322a) and to function as a retainer positioning when the hook bit 312 (312a) slides to the extreme in the groove 322 (322a).

A recess 313 (313a) is provided at the bottom of the slider 31 (31a) to define a retaining function together with the retainer 182 (182a) provided on the bottom wall in the opening 18.

As illustrated in Fig. 15, the hook bit 312 (312a) provided to the slider 31 (31a) merely defines a positioning function by hooking up the retainer 113 each provided on both sidewalls of the tray 111. The first plunger 192 of the release key is merely indicates a matching relation with the hook bit 312 (312a). Accordingly, once the release key 19 is compressed as illustrated in Fig. 16, the first plunger 192 pushes against the hook bit 312 (312a) of the slider 31 (31a) to release externally the connector 32 (32a) by the load released from the coil 33 (33a) to widen up the nozzle 3.

An inner sleeve 183 is extended from the inner wall of the opening 18 of the dust receiver as illustrated in Fig. 17 to accommodate the built-in flexible hose 21 connected to the primary nozzle 2. A limiting ring 211 is inserted to the terminal

of the flexible hose 21, a gradation 184 is provided at the front end of the wall of the inner sleeve 183, and a retainer ring 185 is locked to the terminal of the wall of the inner sleeve 183 for the limiting ring 211 to respectively function a limiting retainer with the gradation 184 or the retainer ring 185 to prevent the flexible hose 21 from falling off the inner sleeve 183 when the flexible hose 21 advances or retreats in the inner sleeve 183.

The positioning grain 22 provided on the wall at the top of the primary nozzle 2 is inserted into the through hole 114 provided at the lower end of the holder 111 and is held in position therein when the flexible hose 21 is compressed to be stored inside the inner sleeve 183. The build-in flexible hose 21 is further secured inside the inner sleeve 183 since the hook bit 311 (311a) in normal condition blocks out the sidewall 23 of the primary nozzle 2.

The expanded nozzle 3 (3a) has a coil 33 (33a) plated between the slider 31 (31a) and the connector 32 (32a). One end of the coil 33 (33a) is fixed to hold against an inner rod 115 or elsewhere as selected inside the dust receiver 11, and further penetrates through the connector 32 (32a) for the other end of the coil 33 (33a) to hold against the slider 31 (31a). Accordingly, once the release key 19 is compressed, the slider 31 (31a) is ejected to push outwardly the connector 32 (32a) to widen up the primary nozzle 2.

As the primary nozzle is released before the expanded nozzle 3 (3a) has not yet fully expanded, the sidewall 23 of the primary nozzle 2 is still blocked out by the hook bit 311 (311a). Therefore, the release key 10 has first to go through a compression to widen

up the expanded nozzle 3 (3a) so to be free from the block out by the hook bit 311 (311a), then after the second time of compressing the release key for the second plunger 193 of the release key 10 to push against the positioning grain 22 of the primary nozzle 2, and finally the primary nozzle 2 is automatically ejected together with the flexible hose 21. Meanwhile the expanded nozzle 3 (3a) retreats to its original status to such extent allowing only the primary nozzle 2 and its built-in flexible hose 21 to be ejected for vacuum cleaning as illustrated in Fig. 19. Furthermore, the build-in flexible hose 21 permits itself to be easily compressed and hidden inside the inner sleeve 183. Once the flexible hose 21 is ejected, it extends to become a longer hose to facilitate cleaning areas where prevent directly access for the hand vacuum cleaner, such as the drawer, slit or groove.

Within the scope of the teaching of the present invention, the design of the structure allowing the width of the nozzle adjustable alone is sufficient to be applied to a hand vacuum cleaner by allowing wider nozzle to expand the reach of the hand vacuum cleaner. Meanwhile the improvement involving the storage of the flexible hose as taught in the present invention can be individually applied to permit a built-in hose that can be doubled with its length when in use and easily stored when not used to eliminate the necessity of external accessories as observed with the prior art of the hand vacuum cleaner. Both of the expanded nozzle and the built-in hose are integrated into the present invention at the same time.

It is sufficient for members of the present invention including

the slider 31 (31a), the connector 32 (32a) and the coil 33 (33a) of the expanded nozzle 3 (3a) to be provided means of retractable sliding relatively matching to one another. The connection structure of each matching hook bit certainly is not limited to the preferred embodiment as illustrated. Any other replacement or substitute with equivalent function may be used. Furthermore, it is not necessarily to provide each expanded nozzle 3 (3a) on both sides of the primary nozzle 2. Instead, a single expanded nozzle 3 or 3a may be provided on either side of the primary nozzle 2 to achieve the same purpose of widening up the nozzle.

Similarly, multiple connectors 32 (32a) may be connected in series by the same or equivalent hook bit for the slider 31 (31a) to drive at one time or by section those multiple connectors 32 (32a) to outwardly expand to define a multi-sectional combination of the expanded nozzle 3 (3a), thus to further widen up the nozzle. Therefore, the preferred embodiment given in the present invention is not to limit the technical scope of the present invention. Any art involving other equivalent replacement and/or substitute should fall within the teaching of the present invention.

The present invention by providing a hand vacuum cleaner with its nozzle width adjustable and built-in flexible hose is innovative, advanced and practical. Therefore, this application is duly filed accordingly.